

RAYPA

Leading
Lab Technologies



Food analysis

COMPACT BLOCK DIGESTION SYSTEM MBC SERIES

EFFICIENT, VERSATILE AND
SCALABLE DIGESTION BLOCK
TO PERFORM SAFE KJELDAHL
DIGESTIONS AND MUCH MORE



Compact block digestion system

Our **MBC Series** block digesters are available in 6 different models with different amount of sample positions and tube sizes to process from 6 up to 40 samples at a time. The system is composed of a heating block, a mobile samples tubes rack and a mobile fumes collector.

MBC Series digesters provide excellent temperature homogeneity in all sample positions with adjustable temperatures by up to 18 segments and a maximum temperature of 450°C.

Among the most common applications it is excellent to perform protein digestion according to the Kjeldahl method, acid hydrolysis for subsequent fat analysis and heavy metals determination.



MBC Series digesters are ideal to be used along with our Kjeldahl distillers (DNP Series) for previous digestion

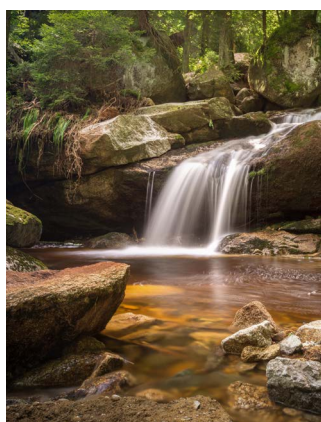
step or with our Fat Extraction System (SX-6 MP Series) for sample acid hydrolysis.

MAIN FIELDS OF APPLICATION



FOOD, FEED & BEVERAGES

Nitrogen, Protein, Fat hydrolysis.



ENVIRONMENTAL ANALYSIS

Nitrogen, Chemical Oxygen Demand, Heavy metal traces.



PHARMACEUTICAL INDUSTRY

Protein, Organic nitrogen, Ammonia, Urea, Formaldehyde.



CHEMICAL INDUSTRY

Organic nitrogen.



FEATURES

VERSATILITY

MBC digesters are versatile for a wide range of applications and samples, even fatty, inhomogeneous and highly foaming samples are compatible with the equipment.

FLEXIBILITY

Delay time, ramps, digestion temperatures and digestion times can be adjusted according to each analysis requirements. It has a total of 9 programs available that can be saved and edited at any time.

HOMOGENEITY

Temperature is homogeneously distributed throughout the metal heating block, ensuring that all samples work under exactly the same conditions, achieving a high reproducibility among the most common applications.

SECURITY

In the event of a equipment failure, a message on the screen indicates the cause and, if appropriate, digestion is automatically stopped. Temperature control is supported by a safety thermostat to avoid overheating.

SCALABLE

There are 6 different models available depending on sample tube size and number of sample positions.

DURABLE

Digestion tubes rack, back support, antidrip tray, fumes collector and heating block cover made of AISI-304, with the latter covered with Halar® coating. Heating block made of aluminum. Rock wool and ceramic fiber are used for thermal insulation.

BENEFITS



Heating block made of aluminum for fast and uniform heating.



Temperature control by microprocessor and safety thermostat.



Several different models available.



Easy to use.



Up to 9 programs for saving application notes.



Fumes collector and antidrip tray included.



Up to 18 editable temperature segments for each program.



Warning messages in case of breakdown.



Full control of digestion conditions.



Calibration port included.



Useful for the determination of multiple components.



Mobile sample tubes rack and fumes collector for a faster samples cooling.

COMPACT

The equipment is designed to occupy as little space as possible following a fully integrated and vertical assembly of the equipment parts to minimize the equipment footprint.

FASTER COOLING

The equipment has a support to place the mobile samples tubes rack away from the heating block for a faster cooling, avoiding long waiting times before performing the final analysis of the digested sample.

PROTECTION

The exhaust fumes collector has improved characteristics to guarantee that the vapors that come out of each sample tube are properly collected and directed to the Fumes Neutralization Unit (Scrubber).

CALIBRATION

Includes calibration port for external probes and adjustable settings to calibrate the device when required.

Compact block digestion system

POPULAR COMPATIBLE METHODS



KJELDAHL METHOD

Kjeldahl digestion consists in the decomposition of nitrogen in organic samples by boiling the sample in concentrated acid solution in presence of a catalyst. At the end of the reaction, ammonium sulphate solution is formed, which can be later distilled and quantified.

$\text{Organic N} + \text{H}_2\text{SO}_4 \rightarrow (\text{NH}_4)_2\text{SO}_4 + \text{H}_2\text{O} + \text{CO}_2 + \text{other sample matrix by-products.}$



HEAVY METALS DIGESTION

Heavy metals digestion in soil, compost and similar samples can be performed with MBC digesters. Firstly, the sample is dried and digested using several temperature ramps with a mixture of $\text{HNO}_3\text{-HClO}_4$ for foliar analysis and $\text{HNO}_3\text{-HCl}$ for the rest of samples. After digestion, the sample is dissolved in HCl and the parameters are analyzed by ICP-OES.



CHEMICAL OXYGEN DEMAND METHOD

The **Chemical Oxygen Demand (COD)** is the amount of oxygen consumed to totally oxidize the organic contents into inorganic products.

The sample is heated in the digestion block in presence of sulphuric acid, and a known amount of potassium dichromate. The excess of dichromate is titrated with an Iron(II) salt. To avoid interferences with chlorides, mercuric sulphate must be added.



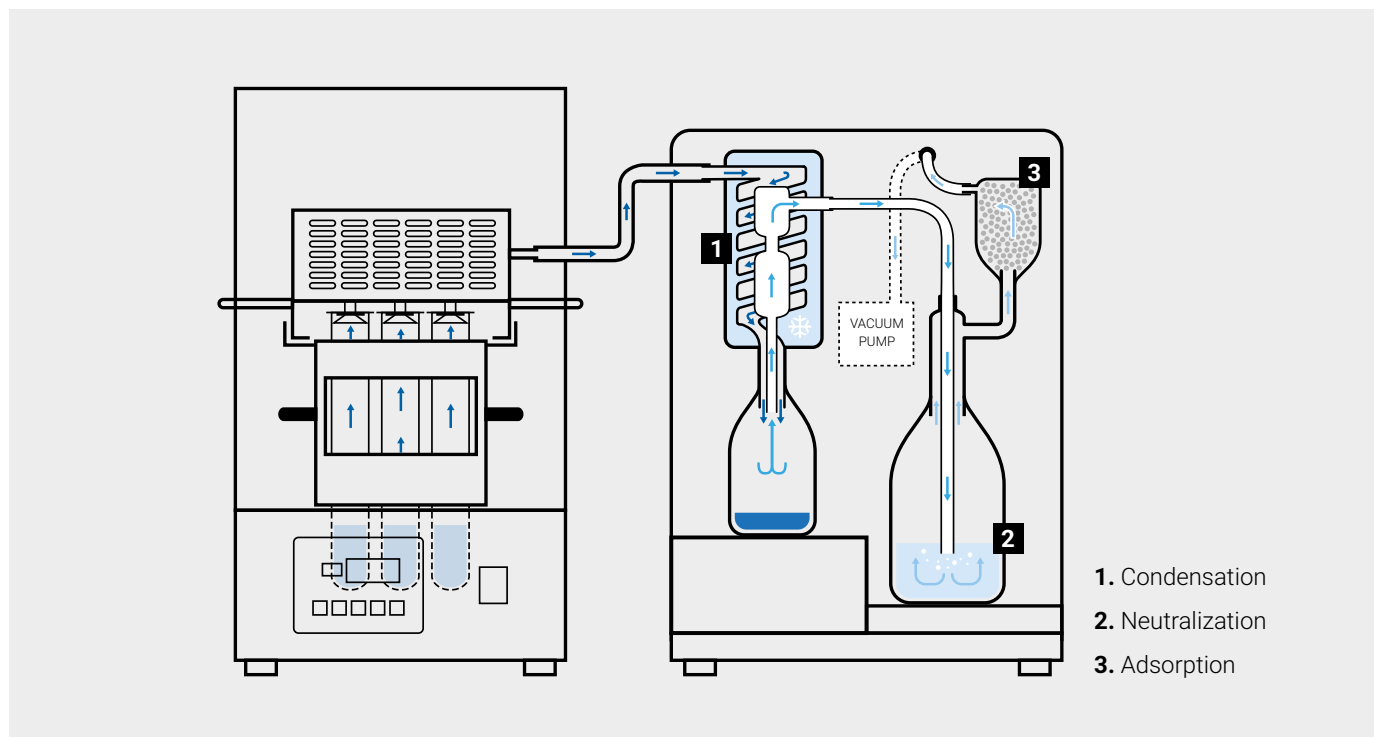
FAT HYDROLISIS METHOD

Fat hydrolysis is the breakage of fat molecules bound as lipoproteins, liposaccharides or sterol esters. In some food and feed samples this is a necessary step to make the fat accessible for extraction. Therefore, the hydrolysis step is key for obtaining reproducible and accurate results in routine fat determination procedures.

The sample is mixed with diluted hydrochloric acid (normally 4N) and heated to break down proteins and high molecular weight carbohydrates into acid soluble constituents. Then it is filtrated and washed with water to remove any impurities. Finally, water is dried from the filter residue for fat extraction.



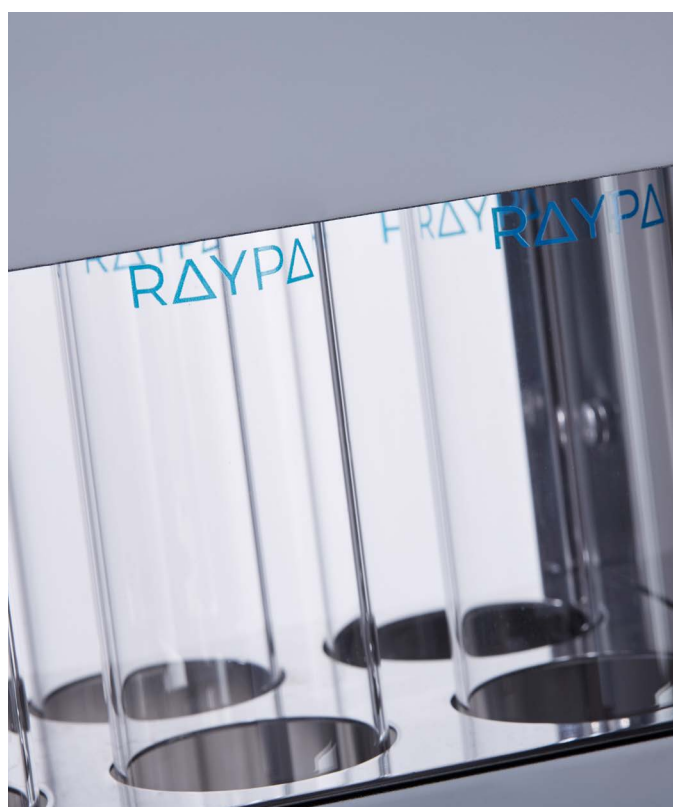
KJELDAHL DIGESTION WITH OUR COMPACT BLOCK DIGESTION SYSTEM CONNECTED WITH OUR SCRUBBER



After loading the samples with the corresponding reagents within the samples tubes rack, the sample tubes rack is placed inside the heating block and the fumes collector is placed on top of the sample tubes rack. The next step is choosing the appropriate program and the equipment starts to heat up, following the predefined time and temperature segments.

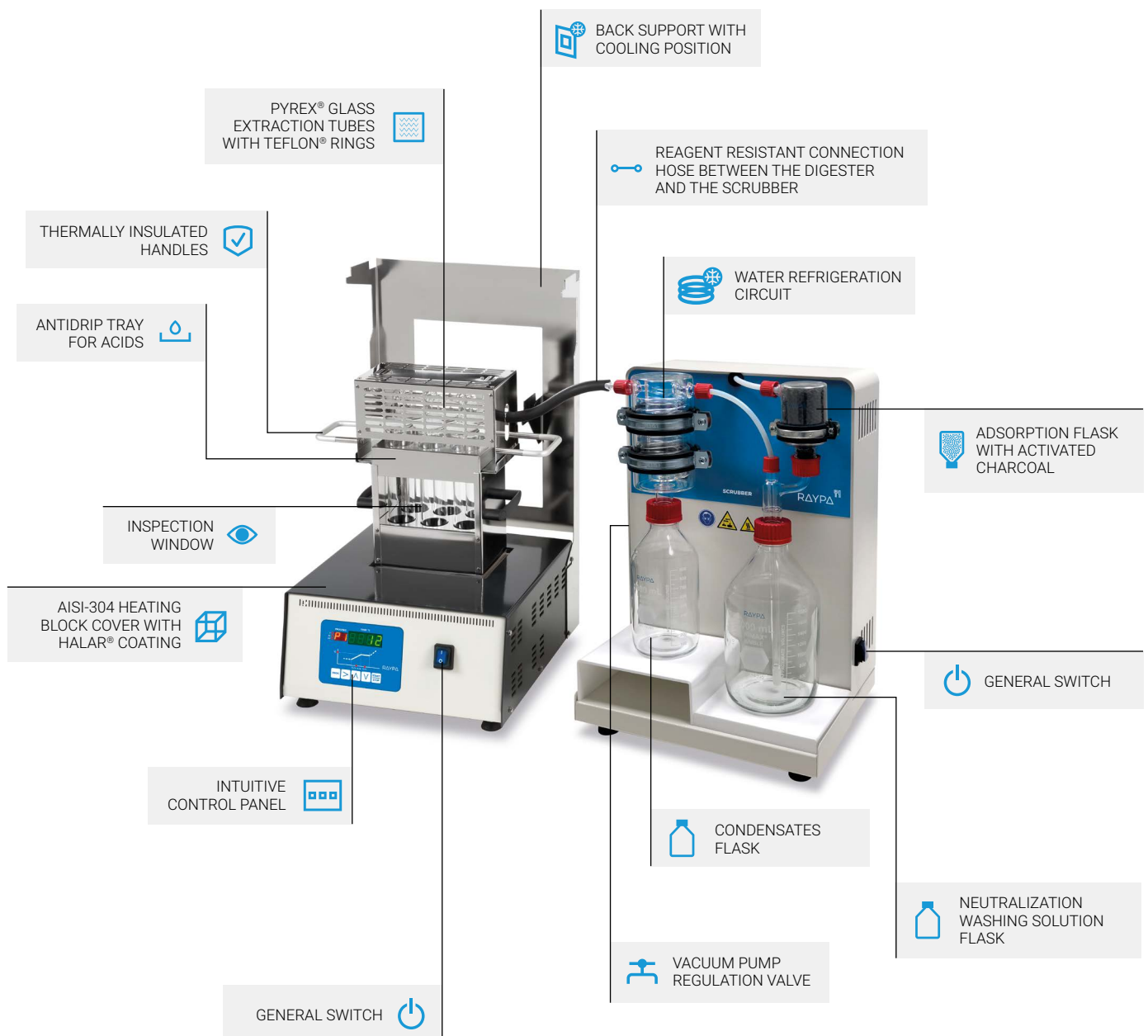
In the process, exhaust fumes generated are completely captured by the fumes collector which in turn are mechanically displaced into the SCRUBBER through the vacuum pump that the SCRUBBER possesses.

The exhaust fumes that enter the SCRUBBER undergo a phase of condensation that acts as a preliminary extractor for steams and dragged liquids, avoiding warming or volume increase in the posterior wash-up solution. The acid or alkaline vapors are then washed and neutralized in the next step. In the final step, most of the remaining particles are retained through granules of activated charcoal.



Compact block digestion system

MAIN FEATURES OF OUR SOLUTION FOR DIGESTIONS WITH INTEGRATED FUMES NEUTRALIZATION





MBC



SCRUBBER



TECHNICAL DESCRIPTION

- Wide model range with units ranging from 6 to 40 sample positions compatible with sample tubes ranging from 100 to 250ml.
- Vertically assembled and mobile sample tubes rack and fumes collector for a faster cooling and minimum footprint.
- Heating block with extensive thermal insulation by rock wool and ceramic fiber and covered with Halar® resin coating.
- Built-in temperature regulator with 9 programs that can be set up with up to 18 individual segments adjustable by maintenance temperature, maintenance time and temperature increase speed.
- Programmable auto-start.
- Easy-to-clean and corrosion resistant fumes collector and external frame made of AISI-304.
- Safety thermostat to prevent overheating.
- Contains calibration port for external probes.

SUPPLIED WITH THE FOLLOWING COMPONENTS:

- Heating block.
- Fumes collector
- Acid antidrip tray.
- Sample tubes support.
- Sample tubes rack.
- Back support.
- Complete set of either Micro (100ml) or Macro (250ml) sample tubes.

TECHNICAL DESCRIPTION








- Efficient and closed fumes evacuation system assisted by a vacuum pump.
- Manually adjustable vacuum pump, with acoustic insulation and an adjustable absolute vacuum between 10mBar and 800mBar.
- Adsorption flask filtrates and neutralizes fumes by a filter of activated charcoal.
- Water refrigeration circuit that condensates the fumes produced during digestions.
- Washing solution flask neutralizes acid or basic fumes.

SUPPLIED WITH THE FOLLOWING COMPONENTS:

- Scrubber with vacuum pump.
- Refrigeration unit.
- Condensates flask of 1L.
- Neutralization flask of 2L.
- Adsorption flask.
- Complete Teflon® gasket set.
- Complete fluorinated elastomer hoses set.
- Anti-drip tray for neutralization flask.
- Support for condensates flask.

Compact block digestion system

TECHNICAL SUMMARY OF MBC SERIES

	Reference	MBCM (micro)	MBC/N (macro)
	Standards compliance	AOAC, DIN, EPA, ISO	
 General information	Sample positions per model	12, 24 or 40	6, 12 or 20
	Compatible sample tubes volume ml	100	250
	Compatible sample tubes size Ø x H mm	26 x 300	42 x 300
 Main applications	Kjeldahl digestions		✓
	Chemical Oxygen Demand		✓
	Heavy metals analysis		✓
	Fat hydrolysis		✓
 Materials	Sample tubes rack, back support, antidrip tray and fumes collector	AISI-304 stainless steel	
	Heating block cover	AISI-304 stainless steel with Halar® resin coating	
	Heating block	Aluminum	
	Heating block thermal insulators	Rock wool and ceramic fiber	
	Tube that connects fumes collector and SCRUBBER	Fluorinated elastomer	
	Gaskets between sample tubes and tubes of fumes collector	Teflon®	
	Sample tubes and tubes of fumes collector	Borosilicate 3.3	
 Control panel	Microprocessor type	PID digital	
	Screens type	LCD	
	Screens size	2 digits x 1 line & 8 digits x 1line	
	Screen displays values of	Current temperature, program number and current segment in execution	
	Screen displays error messages	Electric failure, faulty temperature sensor	
	Visual and acoustic alarms	End of digestion	
	Total number of push-buttons	5	
	Total number of pilot lights	6	
	Pilot lights functions	Heating is activated, temperature is being edited, temperature ramp is ongoing or being edited, temperature maintenance is ongoing or being edited and delay time is ongoing	
		Total number of programs	9
 Adjustable program parameters	Maximum number of ramps per program	18	
	Initial time delay of each program hours:minutes	00:00 - 99:59	
	Time to reach target temperature of the next ramp hours:minutes	00:00 - 99:59	
	Maintenance time of target temperature of each ramp hours:minutes	00:00 - 99:59	
	Target temperature of each ramp °C	Ambient temp. +5 - 450	
 Performance data and recommended environment conditions	Typical capacity for solid loads	Up to 1 g per tube	Up to 5 g per tube
	Typical capacity for liquid loads	Up to 3 ml per tube	Up to 20 ml per tube
	Heating time to 400 °C (depending on model) min	20 - 40	
	Temperature resolution °C	1	
	Temperature stability at 400 °C	± 1	
	Homegeneity at 420 °C	± 5	
 Functions gained with the SCRUBBER accessory	Mechanical evacuation of gases with adjustable speed and acoustic insulation	✓	
	Condensation of exhaust gases by water refrigeration circuit	✓	
	Neutralization of exhaust gases with alkaline or acidic washing solution	✓	
	Filtration and adsorption of exhaust gases with activated charcoal	✓	

✓: Included



TECHNICAL SUMMARY OF SCRUBBER

General information	Type	Closed fumes evacuation system with vacuum pump
	Aspiration	Adjustable vacuum pump
Included processes	Condensation	Circulating water through refrigeration circuit
	Neutralization	Washing alkaline or acid solution
	Filtration and adsorption	Activated charcoal
	Vacuum pump maximum vacuum mBar	10
Performance data	Scrubber water consumption (depending on exhaust fumes) L/min	3 - 5

Accessories

DISTILLATION TUBES

Reference	TB-26300	TB-42300	TB-42300E*
Sample vol. ml	100	250	250
Material	glass	glass	reinforced glass
Dimensions Ø x H mm	26 x 300	42 x 300	42 x 300
Compatible maximum number of sample tubes per model	MBC-6/N	-	6
	MBC-12/N	-	12
	MBC-20/N	-	20
	MBCM-12	12	-
	MBCM-24	24	-
	MBCM-40	40	-

* Reinforced distillation tube for waste water or slurry analysis.



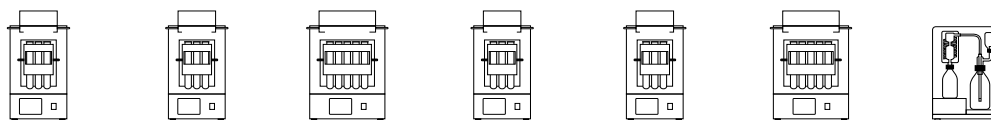
FUMES NEUTRALIZATION UNIT

Reference	SCRUBBER	
Dimensions L x D x H mm	375 x 310 x 540	
Power W	100	
Weight Kg	13	
Voltage V	230	
Frequency Hz	50/60	
Environment conditions	Temperature	between 5°C and 40°C
	Humidity	between 30% and 80%



TECHNICAL DATA

Dimensions and performance



Reference	MBC-6/N	MBC-12/N	MBC-20/N	MBCM-12	MBCM-24	MBCM-40	SCRUBBER
External dimensions L x D x H mm	350x400x635	350x560x635	460x560x635	350x400x635	350x560x635	460x560x635	375x310x540
Power W	1500	2000	2500	1500	2000	2500	100
Voltage* V	230	230	230	230	230	230	230
Weight Kg	27	38	47	30	39	48	13
Frequency Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Sample positions	6	12	20	12	24	40	-
Compatible sample tubes ml	250	250	250	100	100	100	-
Temperature stability at 400°C	±1	±1	±1	±1	±1	±1	-
Adjustable temperature °C	45 - 450	45 - 450	45 - 450	45 - 450	45 - 450	45 - 450	-
Homogeneity at 420°C	±5	±5	±5	±5	±5	±5	-

* Also available with a voltage of 115 V.

Safety

- Alarms and error messages for maximum safety.
- Integrated antipip tray on fumes collector for eventual acid splashes after equipment cools down.
- Corrosion-resistant easy-to-clean external frame made of AISI-304 stainless steel.
- Heating block cover with Halar® coating.

Regulations

Our MBC Compact digestion system is designed to comply with the strictest international directives and standards, including the following:

- **EN-61010-1** Safety requirements for electrical equipment for measurement, control and laboratory use. Part 1: General requirements.
- **EN-61010-2-010** Part 2-010 Particular requirements for laboratory equipment for the heating of materials.
- **EN-61326** Electrical equipment for measurement, control and laboratory use. EMC Requirements.
- **2014/35/UE** Low voltage.
- **2014/30/UE** Electromagnetic compatibility.

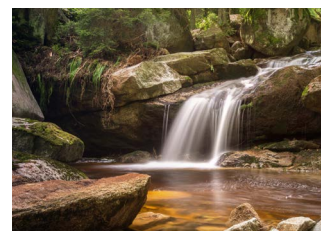
International standardized methods

MBC Series compact block digesters are fabricated guaranteeing compliance with a variety of international standards such as AOAC, ISO, EPA and DIN.

Main fields of application



FOOD, FEED & BEVERAGES



ENVIRONMENTAL ANALYSIS



PHARMACEUTICAL INDUSTRY



CHEMICAL INDUSTRY

CLICK!

ACCESS
ALL RAYPA
PRODUCTS
VIDEOS

+ info

YouTube



Discover more information about all our products on our **Youtube Channel**



Installation guide available, please contact us.



REV.06.2021

RAYPA

Avinguda del Vallès, 322
Pol. Ind. "Els Bellots"
08227 Terrassa (Barcelona) Spain

raypa@raypa.com
www.raypa.com

Tel. +34 937 830 720

R. ESPINAR, S.L.